

VIAGGIO DI LEONARDO FEA
IN BIRMANIA E REGIONI VICINE

XLI.

On the MAMMALIA collected by Signor LEONARDO FEA in Burma and Tenasserim :
by OLDFIELD THOMAS, British Museum (Natural History).

(Plates X, XI).

During the years 1885-1889 Signor Leonardo Fea, of the Museo Civico, Genoa, made a most successful Zoological exploring expedition to Burma and Tenasserim which has resulted in a collection of specimens of all sorts unequalled in extent and variety ⁽¹⁾. Among others the *Mammalia* received their full share of the attention of this indefatigable naturalist, and his collections in this class amount to something like fifteen hundred specimens belonging to 114 species, a collection for whose equal in amount we have to go back to the time of Natterer ⁽²⁾.

The present paper is an attempt to give a general account of the collection, but I fear it is of a nature very unworthy of the splendid materials it is based upon, owing to the many difficulties incidental to its preparation. Chief among these was the fact that the Marquis G. Doria, who had hoped and intended to have prepared the paper in conjunction with myself,

⁽¹⁾ See the large series of papers on the Fea collection published in these *Annali*.

⁽²⁾ Even Natterer, in 18 years, collected fewer specimens though of more species than Fea in 5, his total being 1179 specimens and 205 species, the latter amount being reducible to a considerable extent owing the numerous bad species admitted in the list.

was compelled to relinquish his share in the work on account of an overwhelming pressure of other duties. The loss of so able a colleague, coupled with the lapse of time due to my visits to Genoa being necessarily few and far between, has interfered considerably with the preparation of the paper. Moreover the work on the Kakhyen and Tenasserim specimens, nearly completed in 1889 under the joint authorship of the Marquis Doria and myself, had to be wholly revised for the introduction of the Carin specimens, which arrived later, and for the alteration in form necessary for publication under single instead of double authorship.

Thanks however to Signor Fea's skill and care as a collector the localities have all been most carefully recorded, and this fact alone, in the case of so large a collection, will render the paper of at least some value as a contribution to the geographical distribution of the Burmese Mammalia.

Maps and full notes of the localities at which Signor Fea collected having already been published in the *Annali* ⁽¹⁾ it will not now be necessary for me to give more than the following brief list of the places mentioned in the present paper:

Cadu and Tapaing Rivers are tributaries of the Irrawaddy just north of Bhamo.

Teinzò is a village about 10 miles N. N. E. of Bhamo, N. Burma.

Bia-po, Ciaco, Chialla, Co-bapo, Leito, Meteleo, Tahoe (also spellt Thao), Yado: are in the Carin Hills, or "Karennee," N. E. of Tounghoo, S. Burma.

Palon, lower Burma.

Kokareet, Meetan, Plapoo and Thagata: are in Northern Tenasserim, East of Moulmein, near Mount Mooleyit; the two first in the Valley of the Hounghdaraw, the two latter on the chain of M.^t Mooleyit.

Malewoon: is in the extreme south of Tenasserim.

The other localities mentioned are either too well known to need descriptions or are explained where they occur.

(1) *Ann. Mus. Civ. Genov.* (2) IX, 1890, p. 129.

No general attempt has been made to adapt these names to English methods of spelling, as there is as yet no uniformity in this respect even in English official documents, maps, etc.

I cannot close the introduction without expressing the great obligation I am under to the Marquis G. Doria, who, although he has withdrawn his name from the titular authorship, yet has expended a great amount of care and labour on the collection, has himself determined all the *Chiroptera*, the doubtful ones only being sent to London for comparison, and has helped me throughout with his personal assistance in many different ways.

For the arrangement and revision of the localities, and for much help in other ways I have also to thank Dr. R. Gestro and Signor Fea himself, while in London Mr. Blanford's extensive knowledge of Indian Mammals has often been freely drawn upon for my benefit.

1. *Hylobates hoolock*, HARL.

a. skin in al. Kakhyen Hills.

Many specimens. Yado and Taho, Carins.

Only one of the Carin specimens is pale grey, the rest are wholly black.

2. *Hylobates lar*, L.

a. b. ♀ (w), with her young (b). Meetan, Hounghdaraw Valley. 8. 3. 87.

c. d. ♀ (b) with her young (b). Thagata. 300-400 m. 14. 3. 87.

e. imm. ♀ (b). Thagata. 19. 4. 87.

f. g. ♀ (w) her young (w) Kokareet. 30. 1. 87.

h.-l. ♂. Kokareet. 1. 2. 87.

m.-o. Taho. 1. to 3. 88.

This series presents an interesting proof of the specific identity of the black and white or rather cream-coloured races of *H. lar*. Thus while specimens *c* and *d*, mother and child, are both black, and *f* and *g* both white, specimen *a* is white and yet has a black young one. No better proof could be needed

that the difference in colour is due not to specific distinctness, but to individual dimorphism, altogether independent of sex, season or locality.

This dimorphism is curiously paralleled by that shown by the two forms of *Sciurus bicolor*, the one black and the other cream-coloured, just as in this gibbon.

One of the Taho specimens is remarkable for having dark hands and feet and is therefore without the most characteristic mark of the species: in face markings and all other characters however it is absolutely identical with the other two.

Signor Fea states that this species is not found above an altitude of about 4000 feet.

3. *Semnopithecus obscurus*, REID.

- a. b.* Cadu Ciaung, N. of Bhamo. 19. 4. 86.
- c.* ♂ "Mountains between the Rivers Meekalan and Kyeat,"
Mooleyit, 800-1200 m. alt., 4. 87.
- d.* ♂ Mt. Mooleyit, 1000-1200 m., 26. 3. 87.
- e. f.* ♂ ♀ Thagata, 400-700 m., 4. 87.
- g.* ♂ Taho, 3. 88.
- h. i.* ♀ young. Taho, 2. 88.
- j.* Yado, 12. 87.

The locality at which Signor Fea obtained specimens *a* and *b* considerably extends the known range of this species, as it had not previously been recorded north of Tenasserim.

4. *Macacus assamensis*, McCL.

- a.* juv. skin. 21. 8. 86. Tapen R.; In the forest 2 miles N. of Bhamo.
- b.* ♂. Tounghoo. 1000 m., 22. 12. 87.

5. *Macacus nemestrinus*, L.

- a.* imm. skin. ♀, 5. 87. Kokareet, Tenasserim.

6. *Macacus leoninus*, BLY.

- a.* ♀. Taho. 29. 2. 88.

7. **Nycticebus tardigradus cinereus**, M. EDW.

a. Kakhyen Hills. 4. 86.

b.-e. Co-bapo, Bia-po and Chialà on the Carin Hills.

8. **Felis tigris**, L.

a. Skull. Bhamo.

b. » ♀. Carin Hills.

c. » Malewoon (South Tenasserim).

Basal length of *a* 284 mm.

9. **Felis nebulosa**, GRIFF.

a. ♂. Carin Hills.

10. **Felis temminckii**, VIG. and HORSF.

a. Taho, Carins. 1300 m.

11. **Felis bengalensis**, KERR.

a. Bhamo. 28. 8. 86.

b. c. ♀. Kokareet. 1 and 2. 87.

d. ♂. Thagata. 19. 4. 87.

12. **Viverra zibetha**, L.

a. skin. 13. 8. 86. Two kilometers N. E. of Bhamo.

b. ♀. Yado. 12. 87.

13. **Viverricula malaccensis**, GM.

a. skin ♂. 12. 7. 86. Bhamo.

b. c. skin in al. Bhamo.

d. skull. 11. 86.

e. juv. sk. Meteleo, Carins. 21. 8. 88.

14. **Linsang** ⁽¹⁾ **pardicolor**, HODGS.

a. Meteleo. 5. 8. 88.

(1) The generic name for the Giant Armadillo, commonly written "Priodontes" or "Priodon" is essentially the same word as "Prionodon," and ought to be written so. As that name antedates Horsfield's *Prionodon* by two years the proper name for the present genus is *Linsang*, Müll.

15. **Aretictis binturong**, RAFF.

- a. ♂. Province Amherst.
 b. ♂. Meteleo. 1000 m. 8. 88.

The following are the measurement of the skull of specimen a:
 Basal length 142.5 mm.; greatest breadth 76; interorbital breadth 32; intertemporal breadth 37; palate length 82. The sutures of this skull are not closed up, nor are the canines fully exerted, so that it would evidently have grown still larger. The adult female skull measured by Blanford (Mamm. Brit. Ind. p. 119) had a basal length of only 126 mm.

16. **Paradoxurus hermaphroditus**, PALL.

- a-c. Kokareet. 2. 87.
 d. e. Meetan. 3. 87.

17. **Paradoxurus grayi**, BENN.

- a. Taho, Carins. 1200 m. 20. 3. 88.
 b. c. Paddaung. 1300 m.
 d. Yado. 1000 m. 12. 87.
 e. Meteleo. 1000 m. 27. 8. 88.

18. **Arctogale leucotis**, HORSF.

- a. ♂. Kokareet. 31. 1. 87.

19. **Herpestes urva**, HODGS.

- a. b. ♀. Meteleo. 7 and 8. 88.

20. **Herpestes auropunctatus birmanicus**, THOS.

- a. b. imm. ♂. and ad. ♀. Bhamo.

21. **Lutra vulgaris**, ERXL.

- a. ♂. Taho, Carins. 1200. m. 2. 88.

22. **Putorius strigidorsus**, GRAY.

- a. ad. al. ♀. Thagata, Tenasserim.

Head and body 285 mm.; tail 173; hind-foot 46; ear 9.
 Signor Fea's discovery of this fine species in Tenasserim

extends its known range very considerably, as it has previously only been recorded from Sikim. The specimen agrees in every respect with Mr. Hodgson's typical specimens in the British Museum.

23. **Putorius subhemachalanus**, HODGS.

a. ♂. Kakhyen Hills, E. of Bhamo. 9. 86.

b. ♂. Meteleo, Carins. 23. 7. 88.

c. ♀. Cobapo, Carins. 18. 9. 88.

a. Head and body 320; tail 172; hind-foot 52; ear 19. Skull, basal length 54.6; greatest breadth 32.5; interorbital breadth 11.7; palate, length 26.3; breadth between outer corners of p^4 20.5; gnathion to a median point level with the back of p^4 18.1; p^4 , length 7.0, greatest breadth 3.9; m^1 , breadth 5.0, external longitudinal diameter 2.4, internal do. 3.2.

It appears rather doubtful whether this form is not merely a southern race of *P. sibiricus*, Pall.

24. **Helictis personata**, GEOFF.

a. ad. ♀ Rangoon. 5. 87.

b. Yado, Carins.

c. Meteleo. 9. 9. 88.

The dental characters of *a* fully agree with those of the specimens referred to by me in 1886 (1). As there pointed out, the range of this species appears to divide into two that of the smaller-toothed *H. orientalis*, which is found both to the north and south in Nepal and Java. A spirited drawing of the animal, copied from a sketch of Col. Tickell's, is published by Mr. Blanford (2).

25. **Ursus torquatus**, WAGN.

a-b. ♀ and young. Biapo. 19. 8. 88.

(1) P. Z. S. 1886, p. 59.

(2) T. c. p. 175.

26. ***Tupaia ferruginea belangeri***, WAGN.

Many specimens; Bhamo, Kokareet, Meetan, Plapoo, Thagata and Rangoon, Meteleo; Co-bapo, Bia-po, Carins.

	Head and body	Tail	Hind-foot	Ears
♂. Kokareet	183	175	43	7.0
♀. »	178	180	42	8.0

Mammae one post-axillary, one lateral and one pre-inguinal pair = 6.

Although, in deference to the opinion of Mr. Blanford, I now accept the specific identity of "*T. belangeri*" with *T. ferruginea*, I still consider that the olive-grey northern form, to which these specimens all belong, should be at least recognised as a distinct subspecies.

This species, as evidenced by many adult females, has 6 mammae, as also have *T. tana* and *T. ellioti*, while *T. javanica* has only four, a difference well worth noticing in this difficult genus. Owing to this observation the number given in Mr. Blanford's definition of the genus *Tupaia* (1) will have to be amended.

27. ***Hylomys suillus***, MÜLL. and SCHL.

Many specimens from the Carin Hills.

♀. Bia-po. Head and body 140 mm.; tail 23; hind-foot 24; ear 10; fore-arm and hand 36; heel to front of last foot-pad 11.

Mammae 2 — 1 = 6.

28. ***Talpa leucura***, BLY.

Many specimens from the Carin Hills.

29. ***Anurosorex assamensis***, ANDERS.

a-e. Yado.

f. Thao.

g. Kakhyen Hills.

♂. Yado. Head and body 83 mm.; tail 14; hind-foot 14.5; fore-arm and hand 23; heel to front of last foot-pad 7.8.

(1) Mamm. Brit. Ind., p. 208.

30. **Chimarrogale himalayica**, GRAY.

Kakhyen Hills.

31. **Crocidura perotteti**, DUVERN.

Kakhyen Hills; Bia-po 8. 88.

32. **Crocidura murina**, L.

Bhamo.

33. **Crocidura fuliginosa**, BLY.

Rangoon, Bhamo.

Yado, Bia-po and Coba-po, Carin Hills.

Among this series is included one specimen from Rangoon referred by Mr. Dobson to *C. rubricosa*, Anders., a form that hardly appears to be worthy of specific distinction.

34. **Xantharpyia amplexicaudata**, GEOFF.

Farm Caves, near Moulmein. Many specimens.

35. **Cynopterus marginatus**, GEOFF.

Kakhyen Hills; Bhamò; Mandalay. Meetan, Kokareet (Tenasserim). Many specimens.

36. **Cynopterus blanfordi**, THOS. (Pl. XI, figs. 1 & 2).

Cynopterus blanfordi, THOS. ANN. MUS. CIV. GEN. (2) X, p. 884, 1891.

a-c. Leitò, Chebà, on the Carin Hills, 1000 m.

Ears narrow, margined with white anteriorly, and with a small triangular projection at the base of their outer margin.

Interfemoral membranes quite rudimentary, reduced to a narrow rim just behind the knees; tail and calcar both quite obsolete.

Fur of the upper surface extending thickly along the humerus, the basal half of the forearm on the wing membrane just outside the latter, and also on that between this point and the ankle, on the rudimentary interfemoral membrane, and

along the whole of the hind limbs to the bases of the claws. Below the distribution of the fur is similar, but the fur extends further on the wing-membranes, and of course stops short at the ankles.

Upper incisors broad, triangular, not so styliform as in the other species. Premolars and molars narrow.

Colour throughout dull smoky grey, the head similar to the body.

Dimensions :

	♂.	♀.
Head and body	75	69
Ear (from notch)	17	15.5
Fore-arm	50	50
Lower leg	19	19
Thumb (including claw)	19	19
Greatest depth of interfemoral membrane	—	4.2

Distinguished from all other species by the absence of the calcar, and the remarkable hairiness of the tibiae and feet.

37. **Eonycteris spelaea**, DOBS.

Farm Caves, near Moulmein. Many specimens. Also collected in a cave at Yado on the Carin Hills.

Signor Fea has given an account of his capture of these specimens in the Farm Caves in his "Viaggio da Moulmein al Monte Mulai" (in Bollet. Soc. Geogr. Ital., July 1888).

38. **Carponycteris minimus**, GEOFF.

Macroglossus minimus, Dobs. et auct. al.

♂. Tahò; ♀. Biapò.

39. **Rhinolophus pearsoni**, HORSF.

♂. Tahò. A single specimen.

40. **Rhinolophus affinis typicus**, HORSF.

Tahò.

41. **Rhinolophus affinis rouxii**, TEMM. (?) (Pl. XI, fig. 3).
Tahò.

♀. Head and body 50; Forearm 45; Nose leaf 11×7 ; Ear 14.

Similar to the typical variety in all essential respects, but markedly smaller, and the nose leaf with a small secondary leaflet on each side external to the horseshoe (see plate XI, fig. 3), as in many of the species of *Hipposiderus*, and with the terminal erect portion much shorter, and more abruptly narrowing above.

The proper treatment of this form, has cost both the Marquis Doria and myself much trouble and consideration. During his expedition Signor Fea obtained at Tahò no less than 12 examples of this, and 43 of the larger typical form, finding them at the same localities, and in all cases so absolutely distinct from each other that it is at first sight hardly possible to believe them specifically identical. But an examination of the series from different localities in the British Museum proves that however distinct they may be in the Karin Hills, yet that intermediate specimens occur elsewhere. The type specimen of *R. affinis*, from Java, is unquestionably of the larger form, as also are all the examples from the Indian peninsula and Ceylon. Two specimens from Labuan collected by Mr. Dillwyn are certainly of the smaller race, and another one from Darjiling, although larger (forearm 47 mm.) yet has the nose-leaf characters of the same race. On the other hand other Darjiling specimens appear to be more or less intermediate, and on the whole it seems better to recognise the present form only as a subspecies, which may or may not hereafter have to be raised to the rank of a species. Its identity with Temminck's *R. rouxi* is also another point which remains to be settled.

The presence of supplementary external leaflets not having been noticed before in the genus *Rhinolophus* it would seem as if their occurrence would be of at least specific importance, but in all the species, and markedly in the true *R. affinis*, there is an elevated ridge running along the cheek just below the sides of the horseshoe, and in some cases this is so marked, and has

so little hair on it, that it is almost impossible to decide whether there is or is not a secondary supplementary leaflet.

42. **Rhinolophus minor**, HORSE.

a. Thaò, 2. 88.

b. c. Biapò, 7-8. 88.

Forearms of *a* 38.5 *b* 40.5, *c* 41.

Specimens *b* and *c* from Biapò are markedly larger than usual, and the nose leaf is both longer and broader. In all essential respects however they agree so closely with the true *R. minor*, that they cannot be considered specifically or varietally separable.

43. **Hipposiderus armiger**, HODGS.

♂ ♀. Kakhyen Hills, 1886.

44. **Hipposiderus diadema**, GEOFF.

♀. Bhamò, 1885-86.

45. **Hipposiderus larvatus**, HORSE.

Several specimens. Bhamò 1885-86.

46. **Hipposiderus bicolor fulvus**, GRAY.

♂. Malewoon (South Tenasserim) September 1887.

47. **Hipposiderus amboinensis**, PETERS.

Carin Hills.

48. **Megaderma spasma**, L.

Kokareet (Tenasserim). Several specimens.

49. **Vesperugo** (*Vesperus*) **serotinus**, SCHR.

♀. Yadò. December 1887.

50. **Vesperugo** (*Vesperus*) **pachypus**, TEMM.

♂ ♀. Kakhyen Hills, 1886.

51. **Vesperugo noctula**, SCHR.

♂. Yaddò. A single specimen.

52. **Vesperugo affinis**, DOBS.

♂ ♀. Kakhyen Hills. November 1886.

53. **Vesperugo abramus**, TEMM.

Bhamò ; Mandalay ; Rangoon 1885-86.

54. **Vesperugo kuhlii**, NATT.

♂. Mandalay 1885.

55. **Vesperugo tylopus**, DOBS.

P. Z. S., 1875, p. 473. Cat. Chir. B. M., p. 236.

♀. Biapò.

This species has only been previously recorded from Borneo, but Signor Fea's specimen agrees so closely in all essential characters with the typical specimen in the British Museum that it must unquestionably be referred to the same species. The Burmese individual is rather larger than the Bornean (forearm 36 as compared to 31 mm.), and its inner incisors is without the slight and inconspicuous posterior secondary cusp which caused Mr. Dobson to describe the tooth as "bifid." The brightly contrasted yellow colour of the adhesive callosities on the thumb and hind-foot is as well-marked as in the typical example.

56. **Nycticejus kuhlii**, LEACH.

Rangoon ; Tikekee. Kokareet ; Malewoon (Tenasserim). Several examples.

57. **Nycticejus ornatus**, BLY.

♀. Kakhyen Hills. A single specimen.

58. **Harpiocephalus harpia**, TEMM.

♀. Tahò, 1888. Two specimens.

59. **Harpiocephalus cyclotis**, DOBS.

♂. Kakhyen Hills, N. E. of Bhamò, November 1886. Two specimens.

60. **Harpiocephalus leucogaster**, M. EDW.

♂. Biapò, September 1888. A single specimen.

61. **Harpiocephalus feae**, THOS.

H. feae, Thos. Ann. Mus. Gen. (2) X, p. 884, 1891.

a. ♂. Biapò, Carin Hills 8. 9. 88.

Head and body 39; tail 30; head 17; ear (from base of inner margin) 11; tragus 6.5; forearm 29 (= 1.15 in.); 3.rd finger 52; thumb, including claw 11; lower leg 17; hind-foot, with claws 7.5; calcar 9.

General colour smoky brown, the tips of the hairs above brown, below white. Nasal tubes as in *H. swillus* and *leucogaster* not so remarkably developed as in *H. auratus*. Ears evenly oval larger and more rounded than in the last named form; a minute blunt projection at the base of their inner margins. Tragus as in *H. leucogaster*.

Wings to the base of the unguis phalanx. Half the last caudal vertebra free from the membrane.

Fur far more restricted than in *H. auratus*, the terminal part of the outer surface and the whole of the inner surface of the ears being naked, the arms being only very thickly clothed with scattered brown hairs, the hind limbs but little more hairy, and the interfemoral membrane although thickly covered on the greater part of its upper surface, yet with its edge not fringed.

Colour uniformly dull smoky brown, the tips of the hairs brown above and white beneath.

Outer upper incisors thicker than, but of about the same length as the inner. First upper premolar decidedly smaller than the second; second premolar not quite so long as the canine, but, as in *H. auratus*, larger in section. First lower premolar decidedly shorter than the canine, posterior premolar

rather longer, but still shorter vertically than the first molar, which about equals the canine in height.

This species is distinguished from *H. auratus*, by its duller colour, shorter and simpler nasal tubes, and the proportionate shortness of its first lower premolar. From *H. leucogaster*, to which it appears also to be allied, it differs by its smaller size, smaller ears, and by the different proportions of its upper incisors, that species having the inner ones decidedly longer than the outer.

62. **Vespertilio daubentoni**, LEISL.

♂. Bhamò. A single specimen.

63. **Vespertilio mystacinus**, LEISL.

♂ ♀. Tahò, 1888. Three specimens.

64. **Vespertilio muricola**, HODGS.

♂. Malewoon (South Tenasserim), September 1887. A single specimen.

65. **Kerivoula** (¹) **picta**, PALL.

Several specimens from Bhamò, 1886.

66. **Kerivoula hardwickei**, HORSF.

Kakhyen Hills, 1886. Carin Hills 1888. Several specimens.

67. **Miniopterus schreibersi**, NATT.

A single male from Tahò, 1888.

(¹) I do not by any means see the necessity of changing this word into *Cerivoula* any more than *Nesokia* into *Nesocia*, neither word being of classical derivation. Since we have to retain the *k* in words based on personal names, we cannot in any case change it throughout, and it appears to me a mere affectation of purism to alter names based on local or native terms which happen to contain the letter *k*. And in cases like the present, where the change alters both the pronunciation of the name, and its position in alphabetical indices, the inconvenience of changing an old and widely-known name is at its maximum, and should not be adopted except for reasons far stronger than any that have as yet been brought forward in its favour.

68. **Taphozous longimanus**, HARDW.

Rangoon; Tikekee; Palon (Pegù). Several examples.

69. **Nyctinomus plicatus**, BUCH.-HAM.

Rangoon, June 1887. Several specimens.

70. **Pteromys oral cineraceus**, BLY.

♂. Ampa River, near Kokareet, January 1887.

71. **Pteromys punctatus**, GRAY.

a. ♂. Ciaco, Prulo, on the Carin Hills. 30. 1. 88.

This specimen though differing in the details of its coloration, is evidently specifically identical with the Malaccan individual on which Gray founded his *P. punctatus*. This name D.^r Anderson ⁽¹⁾ has placed as a synonym of *P. elegans*, Temm., but the difference in colour is so great, and the localities are so essentially distinct, that without further material I hesitate to endorse his identification.

72. **Sciuropterus alboniger**, HODGS.

a. Poncan, Kakhyen Hills.

Many specimens from Yado and Taho.

73. **Sciuropterus pearsoni**, GRAY.

a. ♂ skin. in spirit. Yado. Carin Hills, 12. 87.

b. skin. Co-bapo 2. 11. 88.

Hind-foot 34 mm. Ear 14.

74. **Sciuropterus lepidus**, HORSE.

a. ♂. Thagata.

75. **Sciurus bicolor**, SPARRM.

1 ♂. Taho, 1200 m. 3. 88.

5 ♂ and 1 ♀, from Kokareet (2. 87.) Thagata (4. 87) and Mt. Mooleyit.

Palon (Pegù). Malewoon (South Tenasserim).

(1) T. c., p. 290.

These specimens are all of the ordinary type, blackish above and yellow below.

76. **Sciurus pygerythrus caniceps**, GRAY.

43 specimens from Meetan, Thagata and Kokareet.

The female have $0 - 2 = 4$ mammae with the exception of one specimen in which there is a single extra mamma on the right side of the breast.

As the name *S. pygerythrus*, Geoff. antedates *S. caniceps* by ten years the former ought to be used for the whole species instead of the latter and the geographical races described P. Z. S., 1886, pp. 69-70 ought to stand as follows:

77. **Sciurus pygerythrus typicus**, GEOFF.

Many specimens. Palon.

78. **Sciurus pygerythrus phayrei**, BLY.

Taho, Yado and Meteleo, Carin Hills.

46 specimens all precisely identical.

79. **Sciurus pygerythrus griseimanus**, M. EDW.

♀. Kyouk-Myoung N. of Mandalay, Upper Irrawaddy, 5. 4. 86.

Toung-hoo. "Very common round the town" L. F.

80. **Sciurus pygerythrus concolor**, BLY.

Four specimens. Malewoon, 8 September 1887.

81. **Sciurus atrodorsalis**, GR.

74 specimens. Kokareet, January-February 1887.

4 top of M.^t Mooleyit 1800-1900 m., March, 1887.

3 Plapoo, March-April 1887.

1 Farm Caves, near Moulmein, January 1887.

Many specimens. Yado and Taho, Carin Hills, January-March 1888.

All the specimens killed in January or February are ornamented with black backs. Mammae apparently always $0 - 2 = 4$.

This species, in its grey-backed state, appears to lead, almost without a break, into the next form, for which I only provisionally retain the name it has received from D.^r Anderson.

82. **Sciurus gordonii**, ANDERS.

23 specimens. Bhamò, June to August, 1885 and 1886.

These 23 individuals are quite similar to one another, but all were taken at the same season and place, so that their mutual resemblance does not prove any very wide constancy of colouration. D.^r Anderson moreover remarks that the belly colour, usually, and in all these examples, bright red, "occasionally becomes pure yellowish white, and sometimes yellow," a variation that has a most important bearing on the relationship of this form to *S. quinquestriatus*.

83. **Sciurus quinquestriatus**, ANDERS.

a-g. 4 ♂ 3 ♀, Teinzò, on the Mulé Ciaung, N. E. of Bhamò; May, 1886.

These specimens precisely agree with Dr. Anderson's description and figure, and only differ among themselves in that one of them has a faint tinge of rufous in the usually pure white of the belly, and that in some of them the central belly stripe, black in the most typical examples, is grizzled with grey. Since however the colour of the belly and of its longitudinal bands are the very points that distinguish *S. quinquestriatus* from *S. gordonii*, their tendency to variation, combined with the corresponding inconstancy in *S. gordonii* already noted, makes the distinction of the two forms by no means so absolute as would naturally be supposed at first sight. In fact, without daring in the present state of our knowledge definitely to abandon *S. quinquestriatus* as a distinct species I am nevertheless most strongly impressed with its essential identity with *S. gordonii*, and through that with *S. atrodorsalis* and its many allies. The change in the general belly colour from red to white is paralleled in many other squirrels, while the deepening of the grey belly lines of *S. gordonii* into the black ones of *S. quinquestriatus*, a deepening which shows up in brighter contrast the white

ground-colour, represents exactly the development for ornamental and no doubt sexual purposes that has taken place in *S. pygerythrus* var. *phayrei* (1).

Of course as a local and definable race this form ought to have a name, but when further specimens are obtained from intermediate localities and at different seasons of the year, it seems probable that that name will have to be of subspecific rather than of specific character.

It should be mentioned however that the only female of this series in which the mammae are visible has three pairs, *S. gordonii* and *S. atrodorsalis* having only two, but the number of the mammae does not appear in the squirrels to be nearly so constant as it is among the *Muridae*. The numbers of mammae noted under the next heading are an example of their variability in the present group.

84. ***Sciurus finlaysoni***, HORSE.

S. ferrugineus, F. Cuv. *auctorum*.

9 specimens from Bhamò, July 1885.

1 from Rangoon, March 1886.

1 Tounghoo.

1 Palon (Pegù).

The name here used for this well-known squirrel, besides having a priority of five years, as was shown by D.^r Anderson (2), appears to be more convenient than "*S. ferrugineus*" for a species which has such innumerable colour variations, many of which are by no means "*ferrugineus*."

Of the only two specimens of this series in which the mammae are visible, one has four, as in *S. atrodorsalis*, and the other has eight, a number altogether exceptional, and probably abnormal.

The specimens from Bhamò are mostly of the brilliant red colour characteristic of the form described by Gray as *S. splen-*

(1) See P. Z. S. 1886, p. 69.

(2) T. c., p. 243.

dens. One however presents an interesting variation in having its flanks and posterior back of the dull yellowish grizzled grey characteristic of *S. atrodorsalis* and *S. gordonii*. It is just possible that this specimen is simply a hybrid between *S. finlaysonii* and *S. gordonii*, both of which are common at Bhamò; but on the other hand, judged in conjunction with the many other peculiarities in the colouration of *S. finlaysonii*, it gives rise to a suspicion that the present species, with its numerous varieties, may after all be merely an erythristic ⁽¹⁾ form of one of the grey species.

In the same series of colour variations from grey to red there occur, firstly "*S. siamensis*," Gray, admittedly the same as *S. finlaysonii*, but the types of which have many marked resemblances to the more rufous forms of *S. atrodorsalis*, secondly "*S. splendens* var. 4" as described by Gray in 1861 ⁽²⁾ and thirdly "*S. sladenii*," Anderson, which appears to be "*S. finlaysonii*" so far as its head is concerned and "*S. atrodorsalis*" as to its back.

Throughout the above remarks on these four forms of squirrel I have spoken in a very hesitating and tentative way and have given them each nominal specific headings, since it seems incredible that such different forms should not be specifically distinct; but nevertheless the more specimens I see the more I am tempted to believe that *S. finlaysonii*, *sladenii*, *atrodorsalis*, *gordonii* and *quinquestriatus*, not to mention the numerous "species" already referred by Dr. Anderson to one or other of them, are only the ramifications of one single species. In this species, a greater ⁽³⁾ or less ⁽⁴⁾ degree of erythrism, combined

⁽¹⁾ For remarks on erythrism in squirrels, see under *S. badjing* (or, as it ought to be called, *S. notatus*, Bodd.) P. Z. S., 1886, p. 77, and for its effects in the case of other mammals, compare Cat. Marsupials B. M., p. 198, 1888.

⁽²⁾ P. Z. S. 1861, p. 137. Appended to the description of this variety is the following sentence, which antedates my own views on the subject by nearly thirty years.

"This last state would almost lead one to suppose that this squirrel may be only a variety of some other species" (i. e. some species not "*splendens*" at all, but grizzled grey).

⁽³⁾ As, for example: *S. ferrugineus* and *S. splendens*.

⁽⁴⁾ *S. sladenii*.

firstly with sexual ornamentation in the form of black lines either on the back ⁽¹⁾, or on the belly ⁽²⁾, and secondly with a tendency to albinism (partial ⁽³⁾ or total ⁽⁴⁾) and melanism ⁽⁵⁾, would account for every one of the remarkable series of variations that have been described in these squirrels ⁽⁶⁾.

The different races, however, where locally constant, will no doubt be best distinguished by subspecific names, trinomial nomenclature appearing to offer the only means of properly designating them in accordance with the facts of the case.

In connection with these colour variations, there is one point in which collectors can lend considerable aid to systematists, and that is by trying to find out how far the members of any single litter of young are like or unlike each other and their parents.

85. *Sciurus rufigenis*, BLANF.

16 specimens. Top of M.^t Mooleyit, 1800-1900 m. March, 1887.

2 " Plapoo. March and April, 1887.

10 " Taho, Meteleo and Cobapò, Carin Hills.

♀ Head and body 204 mm.; tail 149; hind-foot, 46; ear, 15; hairy part of sole 9; heel to front of long postero-internal pad 23; length of that pad 11; average breadth 2; breadth of foot at base of digits 10.8. Mammæ one lateral and two inguinal pairs = 6.

This rare species has only previously been obtained by Messrs. Davison and Limborg, who collected for Mr. Hume the specimens originally described by Mr. Blanford ⁽⁷⁾ and now in the British Museum ⁽⁸⁾. The present series is of value owing to the majority of the specimens being preserved in spirit, and

⁽¹⁾ *S. atrodorsalis*.

⁽²⁾ *S. quinquestriatus*.

⁽³⁾ *S. bocourti*.

⁽⁴⁾ *S. finlaysoni*.

⁽⁵⁾ *S. germani*

⁽⁶⁾ See also a note on the variability of the colour of *S. finlaysoni* by Prof. A. Milne Edwards. [Bull. Soc. Philom. (7) I, p. 16, 1877].

⁽⁷⁾ J. A. S. B., XLVII, p. 156, 1878.

⁽⁸⁾ See Thomas, P. Z. S., 1886, p. 71.

therefore enabling me to give the above comparatively trustworthy measurements, and to record the number of the mammae with certainty.

The ears in *S. rufigenis* are small and evenly rounded, not pointed, and when laid forward they barely reach half-way towards the eye. The soles of the hind-feet are quite naked except just under the heel; the naked skin is quite smooth, not granulated, and the pads are high and prominent; there are five digital pads, one postero-external about equal in length to that at the base of the hallux, and one long postero-internal pad reaching backwards nearly to the end of the naked part of the sole. The hallux, without its claw reaches to the base of the 1.st phalanx of the 2.nd digit, and the fifth to the middle of the terminal phalanx of the fourth.

The discovery of the species in the Carin Hills is a very considerable extension of its known range, as its only previously published locality was Mt. Mooleyit, where Signor Fea himself obtained the majority of his specimens.

86. ***Sciurus berdmorei***, BLY.

Several skins. Meteleo and Cobapo.

2 ♂. 4 ♀ (in spirit). Thagata, April 1887.

2 ♂. Kokareet, February 1887.

1 ♀. Rangoon.

	Head and body	Tail	Hind-foot	Ear.
Kokareet ♂	194	149	42.5	12.5
» ♂	182	136	41.	12.

Mammae (in 5 specimens). One lateral and two inguinal pairs = 6.

As bearing on the relationship which *S. pygerythrus phayrei* bears to *S. pygerythrus typicus* it may be noted that in the Carin specimens, which are unusually brightly marked, there is a tendency to the development of a dark line along the sides of the paler colour of the belly.

87. *Sciurus maclellandi barbei*, BLY.

Many specimens. Yado and Taho, Carin Hills; Kakhyen Hills, Thagata, Meetan, Kokareet, Rangoon.

	Head and body	Tail	Hind-foot	Ear.
♂ Kokareet	120	118	28.4	10
♂ "	123	126	30.	12
♀ "	122	112	29.5	12
♀ Kakhyen	120	105	28	10

Mammae, one lateral and two inguinal pairs = 6.

It is noticeable that the two specimens obtained in the Kakhyen Hills have their yellow stripes narrower and brighter than any of the others, and form thus an exception to the general rule that the northern specimens are less brightly marked than the southern.

88. *Mus decumanus*, PALL.

Rangoon.

89. *Mus rattus nitidus*, HODGS.

Many specimens. Teinzò; Me-tan-ja, Kakhyen Hills; Bhamò; Pla-poo and Thagata; Palon; Chialla; Yado.

♀. Bhamò. Head and body, 148; tail, 186; hind-foot, 32; ear, 16.

90. *Mus chiropus*, THOS. (Pl. XI, figs. 4-7).

Mus chiropus, THOS. Ann. Mus. Civ. Gen. (2) X, p. 884, 1891.

♂. Carin Hills, Ghecu district, village of Thao, 1400 m.

Head and body 125 mm.; tail 198; hind foot 30; ear 15.5 × 14.5; fore-arm and hand 38.3; heel to tip of hallux 22; heel to front of last foot-pad 14.5; length of last foot-pad 4.0.

Skull — basal length 32.6; greatest length 38.3; greatest breadth 18.5; nasals, length 13.5, breadth 3.9; interorbital breadth 6.2; interparietal, length 6.8, breadth 12.1; length of outer wall of infraorbital foramen 3.2; palate, length 18.7,

breadth outside m^1 8, inside m^1 3.9; diastema 10; length of anterior palatine foramina 6.7; length of upper molar series 7.0.

Similar and allied to *Mus jerdoni*, but distinguished from that as from every other species of the genus by the hallux being opposable and provided with a small flat nail instead of a claw.

Size and proportions as in *Mus jerdoni*. Fur long and straight, not really spinous in the single individual obtained but with a few flattened semispinous bristles intermixed with it, showing that in all probability the species is sometimes (either at a greater age or different season) spinous as in *M. jerdoni*. General colour above rufous grey, the sides from nose to anus and the outer sides of the limbs and the upper surfaces of the hands and feet bright rufous. Belly sharply defined pure white, the hairs however sometimes tipped with rufous. Ears large, rounded, very finely covered with minute rufous hairs. Palate ridges 3 pre- and 5 interdental. Hands with the claws on the digits II to V very small, slender and delicate; pollex with a broad flat nail as usual; hind-toes with large sharp claws, except that the hallux is provided with a nail, but a much smaller one than that of the pollex, not covering more than one third of its upper surface; this hallux is opposable to about the same extent as in *Chiropodomys*. Fifth fore toe reaching to the middle of the first phalanx of the fourth; fifth hind toe reaching to the middle of the second phalanx of the same digit behind. Palms and soles naked, pads large and rounded. Tail very long, evenly covered with short fine hairs, not pencilled; rings of scales averaging about 14 to the centimetre; its upper surface grey and its lower similar but slightly paler.

Skull with a large rounded brain-case; supraorbital ledges well marked; anterior edge of wall of infraorbital foramen projecting very slightly forwards; posterior end of palatine foramina barely reaching to the level of the front of m^1 .

Teeth of ordinary size, their structure quite as in *Mus*, not as in *Chiropodomys*.

This very remarkable new species has all the external characteristics of a gigantic *Chiropodomys*, but its skull and teeth are so wholly those of *Mus* that I prefer for the present to call it a member of the latter genus. In many respects it is allied to the *Mus jerdoni* group of rats, which are themselves more arboreal in habits than the others members of the genus, and among which therefore such a specialization as a grasping hind-foot might be most easily expected to occur.

91. **Mus bowersi**, ANDERS.

4 specimens Thao.

8 » ♂ ♀. Yado, January 1888.

2 » ♂ ♀. Thagata.

2 » ♂ ♀. imm. Pla-poo.

		Head and body	Tail	Hind-foot	Ear.
Yado	♀.	235	253	51	23
Thagata	♂.	216	285	52	22
»	♀.	215	271	51	23

Mammae of 4 Carin specimens, $2 - 2 = 8$, of the Tenasserim females $3 - 2 = 10$.

I am very doubtful as to whether the above difference in the number of the mammae, a character usually of specific importance, does not necessitate the separation of the Tenasserim individuals with $3 - 2 = 10$ mammae from the Carin ones with only $2 - 2 = 8$. The original typical specimen obtained by Dr. Anderson at Hotha, in Yunnan, and a skin collected by Mr. A. O. Hume at Machi, Manipur, both have $2 - 2 = 8$ mammae like the Carin individual sent by Signor Fea. The tendency is therefore evidently for the northern specimens to have 8 and the southern ones 10 mammae, but unless the examination of a much larger series shows this difference to be quite constant, I do not think that the two races, otherwise apparently identical in every respect, ought to be separated specifically, and all Signor Fea's specimens are therefore now placed under one heading.

92. *Mus berdmorei*, BLY.

a. ♀. Bhamò.

b. ♀. Thagatà, Tenasserim.

	Head and body	Tail	Hind-foot	Ear	Heel to front of last foot pad
<i>a.</i> ♀.	142	163	35	22	16.2
<i>b.</i> ♀.	170	—	32	20	16.3

Mammae 3 — 2 = 10. Ears large, rounded, laid forward they reach to or beyond the anterior canthus of the eye. Soles quite smooth, naked; pads very prominent, but rather small. Fifth hind-toe reaching to the base of the first phalanx of the fourth. Tail very finely ringed, the rings of scales averaging from 13 to 15 to the centimetre; its end brown in the Thagata, white in the Bhamò specimen.

Skull measurement of *b.* Basal length 36.4; greatest breadth 21.8; nasals, length 14; interorbital breadth 6.8; interparietal length 4.0, breadth 10.3; anterior zygoma-root, length 4.0; distance from outer corner of one infraorbital foramen to that of the other 10.4; palate length 21.4; anterior palatine foramen, length 7.1; diastema 12.9; length of upper molar series 6.0.

The discovery of this species by Signor Fea both at Bhamò and Thagata confirms the determination (¹) of the two rats from Manipur presented by Mr. A. O. Hume to the British Museum. The original specimen described by Mr. Blyth came from Mergui, so that the species has a considerable range within the Burmese region.

Signor Fea's well preserved spirit specimens are of value as enabling me to give the above comparatively trustworthy measurement, and the more important characters of the ears, feet, tail, and, above all, of the mammae. In its number of mammae this species agrees with the southern examples of *M. bowersi* (see above) but with no other known *rat*, the only other Muridae that have this formula being *mice* of the subgenus *Leg-*

(¹) P. Z. S., 1836, p. 62. See also p. 525 of W. Sclater's valuable paper on Indian Muridae (P. Z. S., 1890), a paper published long after the greater part of the present one was prepared.

gada, and of the *Mus musculus* group (*M. musculus*, *cervicolor*, *bactrianus*, *wagneri* etc.).

93. **Mus coxingi**, SWINH. (1)

a-d. 3 ♂ and 1 ♀. Thagata.

e-f. 2 ♀ Plapoo.

	Head and body	Tail	Hind-foot	Ear.
<i>a.</i> ♂.	183	210	38	20
<i>b.</i> ♀.	176	194	38.8	20
<i>c.</i> ♀.	174	196	39.5	21
<i>f.</i> ♀.	170	186	37.8	18

Mammae 2 — 2 = 8.

For remarks on these specimens see under the next species.

94. **Mus jerdoni**, BLY.

9 specimens Yado.

1 » Taho, Carin Hills.

27 » Top of M.^b Mooleyit, 1800-1900 m.

1 ♀. Plapoo, 3 April 1887.

	Head and body	Tail	Hind-foot	Ear
♂.	159	203	33	21
♂.	160	214	32	19.7
♀.	162	220	32	22
♀.	158	196	30.5	20
♀ (Pla-poo)	142	222	30	16.5

Mammae 2 — 2 = 8.

Signor Fea obtained on Mount Mooleyit and in its immediate neighbourhood a large quantity of rats belonging to the peculiar East Indian group of which *Mus jerdoni* is the best known species. The members of this group are mostly inhabitants of mountainous regions; they all have slender bodies, large ears, long and generally bicolor tails, reddish and more or less spinous fur, pure sharply defined white or yellowish bellies, naked

(1) Nom. emend.; *M. coninga*, Swinh. P. Z. S., 1864, p. 185, improved into *M. coxingi*, id. P. Z. S., 1870, p. 636, but as the species is named after the pirate chief Coxing, the proper form of the word is as above.

soles, and $2 - 2 = 8$ mammae. Within the group the specific distinctions are exceedingly vague and difficult to make out, depending for the most part nearly entirely on size and on the lengths of the tail and feet. The proper determination of Signor Fea's specimens has therefore been by no means easy, and the present plan, by which all the specimens with hind-feet less than 35 millim. long are referred to *M. jerdoni*, and those in which that measurement exceeds 37 millim. to *M. coxingi*, must be looked upon as provisional. In the series from Mt. Mooleyit the tails are usually wholly bicolor from base to tip as in typical Himalayan specimens of *M. jerdoni*, but sometimes the lower side of it is brown like the upper ⁽¹⁾, a difference therefore that this series proves not to be so absolutely diagnostic as it has been usually supposed to be. On the other hand, in all the larger Thagata and Plapoo specimens here referred to *M. coxingi*, the tail is bicolor for its basal half and wholly white for its terminal half, very much as in *Mus blanfordi* ⁽²⁾. This character however is in all probability a merely local peculiarity, since Mr. Swinhoe's original series from Formosa mostly have the tail uniformly bicolor, as in *M. jerdoni*. That it is not a character of specific importance is shown by fact that the Paris Museum series of the closely allied *Mus confucianus* ⁽³⁾ contains specimens with both bicolor and white-tipped tails. Finally even if these Thagata and Plapoo rats turn out to be specifically distinct from *M. coxingi* there is yet another closely allied form which may be found to grade into them, namely *M. hellwaldi*, Jent. ⁽⁴⁾ from Celebes, so that in any case it would not be safe to describe them as new. Rats of this type are also known from Sumatra, Java, Borneo and the Philippines, but it is at present impossible to say how many species they really form, and it may easily be that all the differences now believed to exist between the described species

(1) This only occurs in a few of the larger specimens, and may be due to age.

(2) See P. Z. S., 1881, p. 542, pl. L.

(3) M. Edw. Rech. Mamm., p. 286, Atl. pl. XLI, fig. 2, 1884.

(4) Notes Leyd. Mus. I, p. 8, 1878.

will be found to disappear on the examination of larger series of specimens from intermediate localities.

95. **Mus concolor**, BLY.

Many specimens, mostly from Bhamò; the others from the Kakhyen Hills, Teinzò, Mandalay, Meetan, Kokareet, Mergui.

	Head and body	Tail	Hind-foot	Ear
♂. Bhamò	100	131	25	13
♂. Kakhyen Hills	110	143	25	13
♀. Bhamò	115	136	24	13
♀. "	112	147	24.5	12.8

Mammae 2 — 2 = 8.

The large series of this species obtained by Signor Fea are singularly uniform in character, no appreciable differences between the specimens being observable. It is evidently both a highland and a lowland form as it is found both on the Kakhyen Hills and at Bhamò. At this latter place it must be exceedingly common, as Signor Fea obtained a very large number there, where, he says, they are found in the houses.

96. **Mus nitidulus**, BLY. .

10 specimens, Yado, Carin Hills.

5 " Bhamò.

	Head and body	Tail	Hind-foot	Ear
Bhamò ♂.	77	84	19.1	12.0
" ♀.	74	84	18.4	13.0
" ♀.	70	77	17.7	12.3

Mammae 3 — 2 = 10.

All these specimens have spiny fur. The number of the mammae, now recorded for the first time, shows that the species is allied to the *Mus musculus* group of mice; although it appears to be quite distinct from any of them. The characters of the zygoma-root, and of the hind-feet however do not precisely agree with the description given by me in 1881 (1), but the differences do not appear to be of specific importance.

(1) P. Z. S. 1881, p. 550.

97. **Mus musculus**, L.

a-f. Kakhyen Hills.

g. Kokareet.

h-j. Yado, Carin Hills.

98. **Mus** (*Leggada*) **buduga**, GRAY.

a-b. ad. and imm. ♂ Bhamò.

♂. Head and body 62; tail 57; hind-foot 15; ear 9.0.

Apparently similar in every respect to Calcutta specimens.
Fur slightly spiny.

99. **Vandeleuria oleracea**, BENN.

a-b. ♂ and ♀. Kakhyen Hills.

Many specimens from Biapo and Yado, Carins.

b. ♀. Head and body 72; tail 114; hind-foot 16.5; ear 13.

Mammae 2 — 2 = 8.

100. **Chiropodomys gliroides**, BLY.

Mus gliroides, Bly., J. A. S. B. XXIV, p. 721, 1855.

Mus peguensis, Bly., J. A. S. B. XXVIII, p. 295, 1859.

Chiropodomys penicillatus, Peters, M. B. Ak. Berl., 1868, p. 448, pl. I;
Lütken, P. Z. S., 1886, p. 418; Doria, Ann. Mus. Civ. Genov. (2) IV, p. 631, 1887.

Chiropodomys gliroides, Thomas, P. Z. S., 1886, p. 78; W. Sclater., P. Z. S., 1890, p. 532.

12 specimens. Yado and Thao, Carin Hills, Kakhyen Hills and Thagata.

The following series of measurements of this rare species may be of service.

		Head and body	Tail	Hind-foot	Ear
Kakhyen Hills	♂.	74	111	18.8	14
" "	♀.	77	111	17.5	15
Thagata	♂.	92	123	20.4	15
"	♂.	87	128	20.3	15
Pulo Nias (Modigliani)	♀.	77	107	19.0	14
Buitenzorg, Java (Ferrari)	♀.	69	105	18.1	12

Mammae 0 — 2 = 4.

As pointed out by Doria (*l. c.*) the occurrence of this species in the Kakhyen Hills strongly confirms the suggestion as to its identity with the Assamese *Mus gliroides*, Blyth, the type of which seems unfortunately to have disappeared from the Calcutta Museum. The type of *Mus peguensis* is however still in existence and has been sent over to London for comparison. This proves to be unquestionably identical with the present species.

As already pointed out by Doria, the Thagata specimens are less rufous in colour than those from the Kakhyen Hills, but the difference is not sufficient to separate the two forms specifically, even though in addition these Thagata individuals are somewhat larger than the others, as is shown in the above table.

A list of the known specimens and localities of *Ch. gliroides* has been published by Doria in the paper above referred to, and Signor Fea is to be congratulated on the help that his specimens have given in elucidating the history and distribution of this beautiful little Mouse. W. Sclater (*l. c.*) has also given a valuable description, with figures, of the Calcutta Museum specimens of the species.

101. **Microtus** (*Neodon*) **melanogaster**, M. EDW.

a. ♂. Kakhyen Hills.

Head and body 76; tail 35; hind-foot 16; ear 7.1.

The posterior upper molar of this specimen agrees very closely with that figured by Blanford (¹) in his paper on the Indian Arvicolae.

The present is the first recorded occurrence of any species of vole within Burmese territory.

102. **Rhizomys sumatrensis erythrogenys**, ANDERS.

9 specimens. Meteleo (July-September, 1888) Yado, December, 1887, January, 1888).

These specimens unquestionably belong to Anderson's *Rh. erythrogenys*, but I do not think the form to be specifically

(¹) J. A. S. B. L., pl. I, 1881.

distinct from *Rh. sumatrensis*, of which it may be looked upon as a local race. The markings are quite similar to those of that species, but the brown in the centre of the crown is deepened into black, while the rufous of the cheeks is much intensified. The skulls of both are quite alike.

The two sexes are quite alike in colour, and as to age the only difference appears to be that the backs get darker as age advances. The foot-pads, as shown in the single specimen preserved in spirit, are exceedingly rough and granulated, and the two posterior pads are run together into one large triangular pad, the anterior four being small and rounded as usual. The hind-foot of this specimen measures 59 mm. in length, and the ear 14.

103. ***Rhizomys pruinosus***, BLY.

a-g. ♂ ♀. Kakhyen Hills

h-i. ♂. Taho, Carins, 1200 m., 2. 88.

j-k. ♂ ♀. Meteleo, 1000 m. 8. 88.

♂ (skin in al.). Head and body (*c*) 350; tail 120; hind-foot 47; ear 14. Mammae 2 — 3 = 10.

The surfaces of the palm and sole-pads in this species are coarsely and prominently granulated, in marked contrast to those of *R. badius*.

104. ***Rhizomys badius***, HODGS.

Many specimens, Yado, Bia-po, Chialla, Meteleo and Taho, Carin Hills; Palon.

1 ♀. Kakhyen Hills.

5 ♂ and 19 ♀. Kokareet.

2 Palon.

	Head and body	Tail	Hind-foot	Ear
♀. Kokareet	182	57	28	7.2
♀. »	183	62	28.3	7.7

Mammae 2 — 2 = 8⁽¹⁾. Sole-pads small, rounded, and smooth or very faintly granulated.

(¹) One specimen however, out of 19 females examined, has a third inguinal mamma on one side, but it is but little developed and is no doubt an abnormality.

Four out of 12 Carin skins have marked white frontal patches.

105. **Hystrix bengalensis**, BLY.

a. Yado, 1000 m. Carin Hills.

Measurement of the skull (mp⁴ still in position; m³ up, but unworn). Basal length 119; greatest breadth 68; nasals, length mesially 64, laterally 47, breadth anteriorly 29, posteriorly 40; length of naso-premaxillary suture 39; length of frontal suture 29; length of parietal from bregma to back of occipital crest 34; diastema 38; length of upper molar series 27; distance between outer corners of the two infraorbital foramina 53. Height of nasion, from centre of palate 51.

106. **Atherura macrura**, L.

a. ♂. Yado, Carins. 1000 m.

b. imm. ♀. Mongioch, in the Kakhyen Hills, 80 kilomet. E. of Bhamò.

c. (in spirit) Carin Hills.

107. **Sus cristatus**, WAGN.

Skull, ♂. Thagata, Tenasserim.

108. **Rusa aristotelis**, G. CUV.

a. Skull and horns. Katha, Upper Irrawaddy.

b. Horns. Mandalay.

109. **Panolia eldii**, ANON.

a. horns. Mandalay.

110. **Cervulus muntjac**, ZIMM.

♂. Taho, Carins. 2 February 1888.

111. **Cervulus feae**, THOS. & DORIA (Pl. X).

Cervulus feae, Thos. & Doria, Ann. Mus. Civ. Gen. (2), VII, p. 92, 1889.

a. ♂. Thagata, Village on the Mountains S. E. of Mooleyit. 27. 3. 87.

Dimensions of the type, an adult male, preserved as a skin:

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Head and body (c) 880 mm.; tail, without terminal hairs 103 mm., with hairs 145; hind-foot, including hoof 288; head 220; ear, above crown 76; muzzle to anterior canthus of eye 120; to burr of horns 250; horn-pedicle, measured behind 59; longest horn 53. Elbow to tip of fore-hoof 353.

Size as large as in the Himalayan Muntjacs.

General colour of body brown, finely speckled with yellow; face uniform dark brown, the centre of the crown, the horn-pedicles, occiput, and the region round the bases of the ears bright yellow; a black line running up the inner side of each horn pedicle. Neck uniform brown. Fore-legs brown proximally, darkening to black on the metacarpals, but the terminal inch next to the hoof is white all round, and there is a line of scattered white hairs running up the front of the leg as far as the carpal joint. Hind-legs similarly coloured, except that there is a marked white line running up the anterior edge of the tibia. Tail short, its upper side deep black, its sides and lower surface pure white, the two colours forming a very striking contrast. Under surface of body brown, mixed with whitish on the chin, and inner sides of fore and hind limbs.

Lachrymal glands large and prominent; frontal glands on the other hand apparently entirely absent.

This Muntjac is most nearly allied to *C. crinifrons*, Selater (¹), a native of Ning-po, China, agreeing with that species, alone of the genus, in its brown instead of red or yellow general colour and its black and white instead of red and white tail. It differs however by not possessing the peculiar frontal tuft characteristic of *C. crinifrons*, by the consequent clear definition of the face markings, by the white line running down its lower leg, and by its far shorter tail.

Signor Fea is to be congratulated on his discovery of this magnificent addition to the fauna of Tenasserim, and it has given the Marquis Doria and myself sincere pleasure to connect his name with it.

(¹) P. Z. S. 1880, p. c. pl. I.

112. *Orcella brevirostris*, OWEN.

O. fluminalis, Anderson, P. Z. S., 1871, p. 143.

a. Perfect skeleton. R. Irrawaddy near Bhamò.

Total length before skinning 2070 mm.; circumference behind pectoral fins 1270 (*Fea*).

Dimensions of the skull, the largest recorded: Basal length 293; greatest length to back of condyle 320 (= 12.65 English inches); greatest breadth 214; length of snout from median point between preorbital notches 137; length of snout from anterior edge of superior nares 183; breadth between preorbital notches 117; greatest breadth of superior nares 48; greatest breadth of brain-case between temporal fossae 163; length of pterygoids 57;

Teeth $\frac{19-19}{14-14}$. The five posterior teeth on each side of the upper jaw are set in a line internal to that of the rest, are markedly smaller, and are less deeply unbedded in the jaw, so as to be easily pulled out and lost in the cleaning of the skull. This I presume has actually taken place in the skulls previously described, all of which are said to have only 12 or 14 teeth on each side of each jaw.

Our knowledge of this interesting dolphin rests almost entirely upon the magnificent monograph written by Dr. Anderson (¹), in which a full and most valuable account is given of its anatomy, osteology and placentation. On one point however I am constrained to differ from the author of that monograph, namely as to the specific distinction of the dolphin of the Irrawaddy from that of the Bay of Bengal. The material examined in making this criticism consists of the following.

1. Specimen *a* from Bhamò, with which Signor Fea has sent a careful drawing prepared and coloured from the animal in the flesh.

2. A skeleton from the Irrawaddy, named by D.^r Anderson himself (*O. fluminalis*, specimen *a* of the List of Cetacea in the British Museum, 1885).

(¹) Zool. Yunn. Exp. Mamm. pp. 358-416, pls. XXV-XLIII, 1878.

3. The typical skull of *O. brevirostris*, Owen, from Vizagapatam.

4. A stuffed specimen and its skull from Singapore; presented to the British Museum by the Government of the Straits Settlements.

5. A skull from Muara Island, Brunei River, N. Borneo; collected and presented by P. W. Bassett Smith, Esq. of H. M. S. "Rambler." These latter specimens extend the known range of *Orcella* considerably and show that it is far more widely distributed than has been previously supposed.

All the reasons assigned by D.^r Anderson for the distinction of "*O. fluminalis*" from *O. brevirostris* appear to me to be too variable and of too little importance to justify their separation, and I suspect that had it not been for Capt. Bowers's unfortunate mistake in saying that the Irrawaddy dolphin was a "uniform dirty white" when it really was of the same colour as the ordinary form (¹) D.^r Anderson himself would not have separated them. In fact, so far as I can see, specimen 1 of the above list differs from 2, both being "*O. fluminalis*," more than 2 does from 3, the actual type of *O. brevirostris*.

113. *Manis javanica*, DESM.

a. ♂. Kakhyen Hills. 9. 9. 86.

b. ♀. Dona Mts. E. of Kokareet. 15. 2. 87.

c. juv. ♂. Kokareet. 2. 87.

114. *Manis aurita*, HODG.

a. ♂. Bhamò. 7. 6. 86.

b. Bia-po 800 m.

c. Yado 1000 m.

Specimen *a*, otherwise indistinguishable from ordinary specimens of *M. aurita*, presents the remarkable peculiarity of not having the central row of scales continued quite to the end of the tail, but passing off at about five scales from the tip into the lateral paired series, exactly as in the African Pangolins,

(¹) See Anderson, Zool. Yunn. Exp., p. 358 (foot-note).

to which this arrangement of the scales has been hitherto supposed to be peculiar ⁽¹⁾. The presence or absence of this character is not therefore quite so absolutely diagnostic of the two groups of *Manis* as it has been usually believed to be. It may also be noted that the exact converse of this variation, occurring in an African Pangolin, is the main character relied upon in the description by D.^r Noack of his *Manis hessi* ⁽²⁾.

(¹) See Jentink, Notes Leyd. Mus. IV, p. 193, 1882.

(²) Zool. J. B. IV, p. 100, 1889.



Cervulus feae



5



2



4



1



3



7



6

1. 2. *CYNOPTERUS BLANFORDI*.
3. *RHINOLOPHUS AFFINIS ROUXI*.
4-7. *MUS CHIROPUS*.